NSF: FY 2006 Overview

Thomas N. Cooley, CFO and Director,
Office of Budget, Finance and Award Management

November 9, 2005

Hosted by: Seton Hall University

Ask Us Early, Ask Us Often!!

- **Tom Cooley**
  - Chief Financial Officer & Director, Office of Budget, Finance & Award Management
  - tcooley@nsf.gov
  - (703) 292-8200

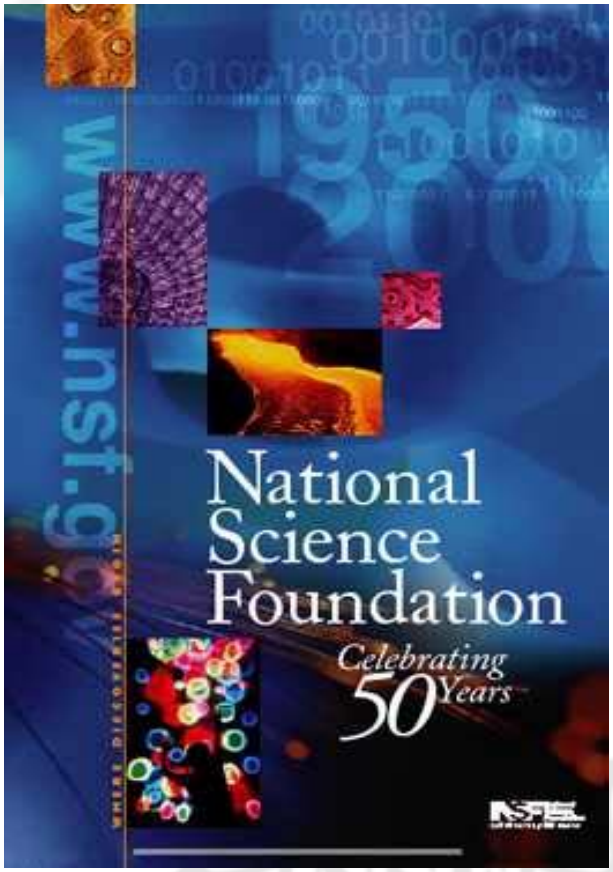
Main Topics

- Origins of NSF
- NSF in a Nutshell
- Congress and the Budget
- The NSF FY 2006 Budget Request
  - Priority Areas
- Current Proposal, Award and Funding Trends
- Challenges, Opportunities and the Long Hard Road Ahead
  - Administrative requirements issues

Origins of NSF

Origins of NSF

- "The Government should accept new responsibilities for promoting the flow of scientific knowledge and the development of scientific talent in our youth."
  - Science, The Endless Frontier, 1945
- 1947: Congress Approves, Truman Vetoes: Agencies created in the meantime
- 1950: Compromise Bill Approved & Signed by Truman



NSF Act of 1950

- “To promote the progress of science...”
- NSB (24) and 1 Director, appointed by the President
- Encourage & develop a national policy for the promotion of basic research and education in the math, physical, medical,biological, engineering and other sciences
- Initiate & support basic scientific research in the sciences
- Evaluate the science research programs undertaken by agencies of the Federal government
- Provide information for S&E policy formation

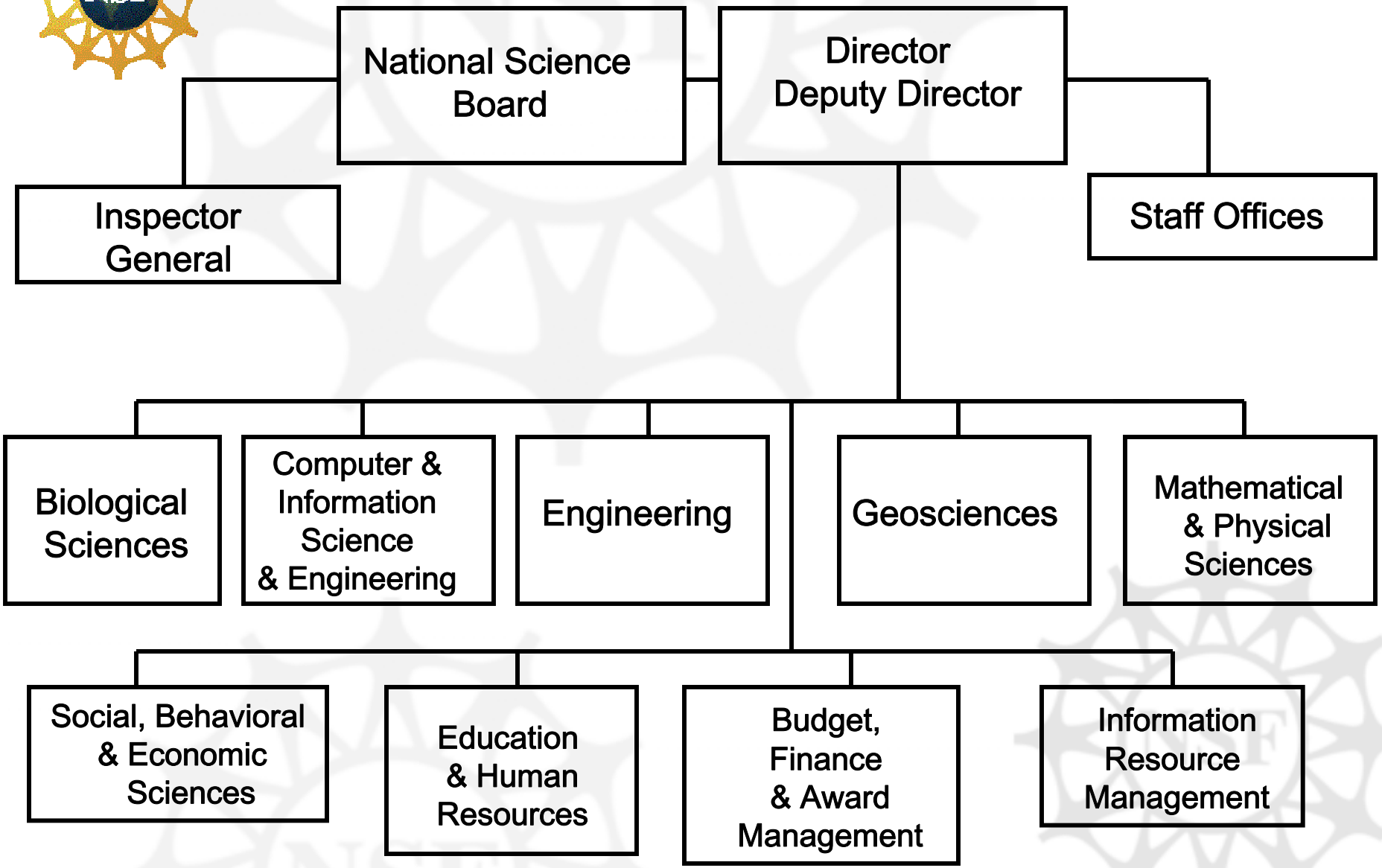
NSF Vision

Enabling the nation's future through discovery, learning and innovation.

NSF in a Nutshell

- Independent Agency
- Supports basic research & education
- Uses grant mechanism
- Low overhead; highly automated
- Discipline-based structure
- Cross-disciplinary mechanisms
- Use of Rotators/IPAs
- National Science Board

National Science Foundation



NSF: Recent Personnel Changes

- Joseph Bordogna resigned as Deputy Director in June 2005 after nine years in the position
- Kathie Olson nominated as Deputy Director and confirmed by the Senate
- Dr. Richard Buckius, Division Director of the Chemical and Transport Systems, serving as Acting Assistant Director for the Engineering Directorate
- David Lightfoot named Assistant Director of Social, Behavioral and Economic Sciences (SBE)
- James Collins of Arizona State University named Assistant Director of Biological Sciences (BIO)
- Office of Cyberinfrastructure, formerly known as the Division of Shared Cyberinfrastructure, is now in the NSF Office of the Director
- Search for new EHR Assistant Director ongoing

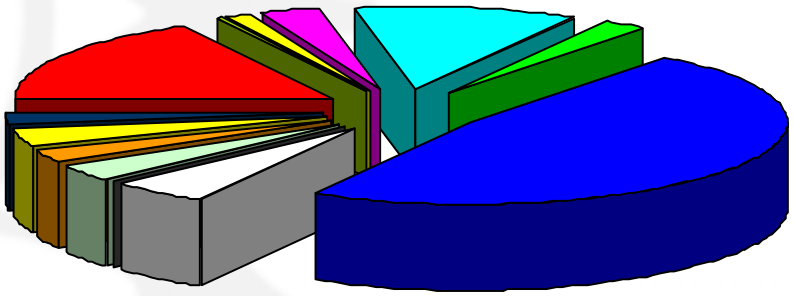
Congress and the Budget:

The Future is Dimly Lit
and
For R&D the Future May be Dim

NSF's Key Congressional Players

- House and Senate Budget Committees
- Authorization Committees
  - House Science Committee/Sub-committees
  - Senate Health, Education, Labor & Pensions Committee
  - Senate Commerce, Science & Transportation Committee
- Appropriations Committees
  - New committee structure: House and Senate – new staff

Role of Appropriations Subcommittees

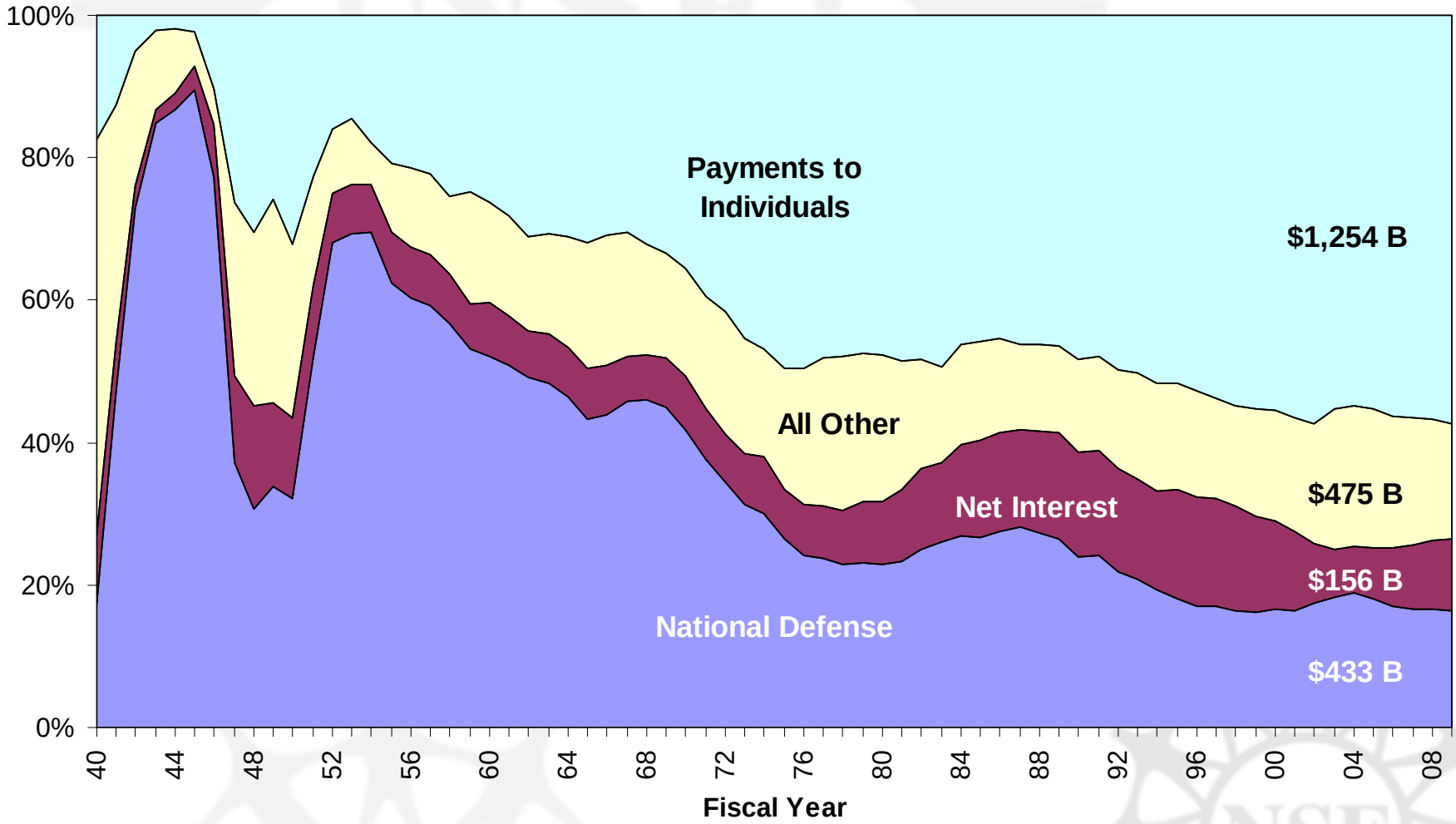


- In FY 2005, they dispersed > $820 billion of discretionary funds.
- Work with Congressional leadership and members to address priorities of budget resolution.

Subcommittee Changes for FY 2006
New Subcommittees for NSF

- Both the House and Senate reorganized their Appropriations Subcommittee structures.
- The House reduced its number of subcommittees from 13 to 10. As a result, NSF is now under the purview of the Science, State, Justice and Commerce Subcommittee.
- The Senate reduced its number of subcommittees from 13 to 12; NSF is now under the purview of the new Commerce-Justice-Science Subcommittee.
- The Subcommittees are distributing ~$840 billion for FY 2006.

Percentage Composition of Federal Government Outlays



Total Outlays for FY 2004 = $ 2,318 Billion

FY 2005 and 2006 R&D Budget Highlights

FY 2005

- DHS: 20 % over 2004
- Agriculture: 7.8 % over 2004
- Defense: 7.9 % over 2004
- NASA: 2.0 % over 2004
- NIH: 2.6 % over 2004
- Commerce: 4.6 % over 2004
- Energy: $3.3 B in 2005
- USGS: 0.3 % under 2004
- EPA: 2.8 % under 2004

FY 2006*

- DHS: 23.8 % over 2005
- Agriculture: 15.6 % under 2005
- Defense: 0.6 % over 2005
- NASA: 4.9 % over 2005
- NIH: 0.5 % over 2005
- Commerce: $565 M - NOAA
- Energy: $3.0 B in 2006
- USGS: 4.6 % under 2005
- EPA: Decrease to $569 M

* Impact of appropriations not yet known

R&D Budget

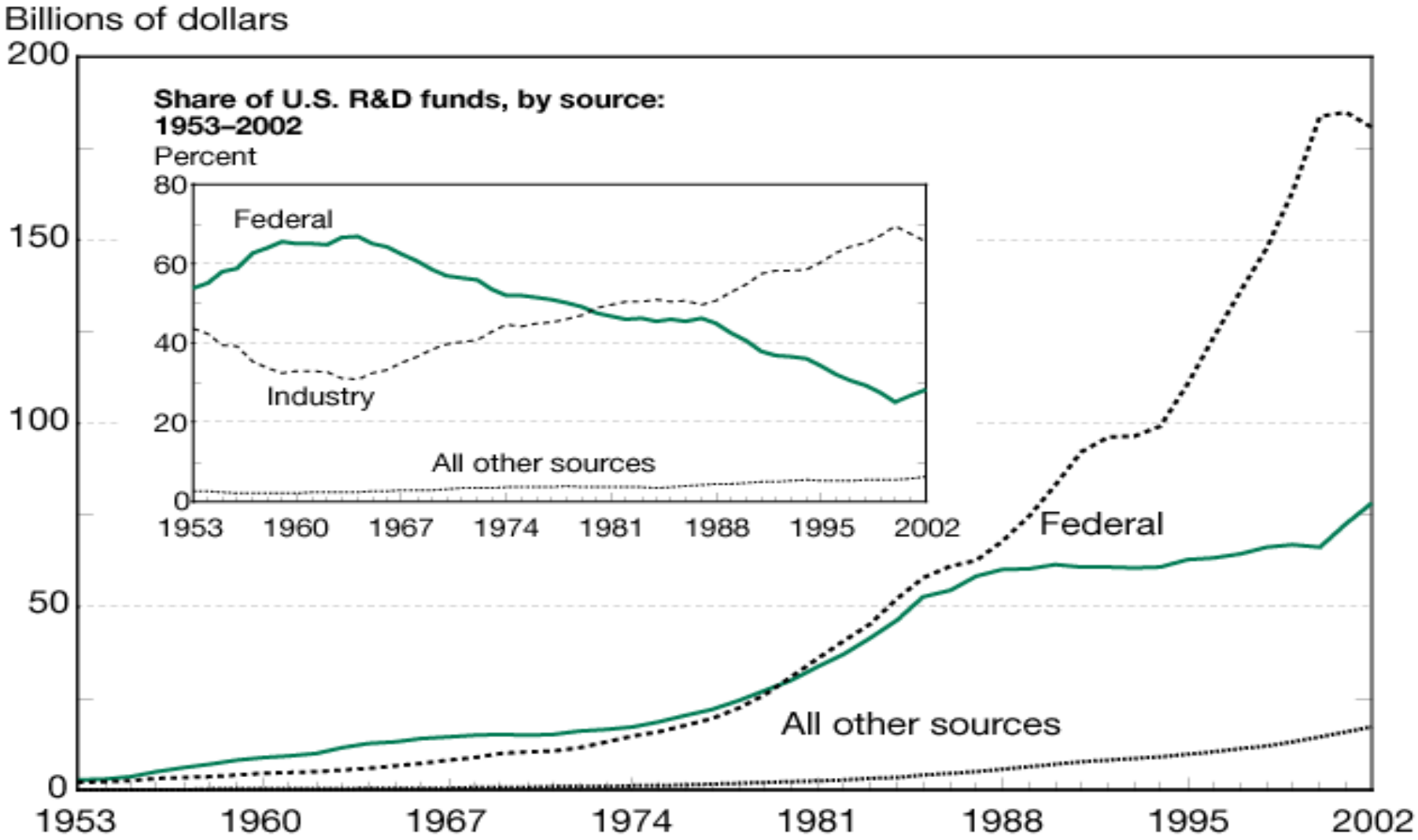
Budget Authority (dollar amounts in millions	2006 Proposed*	Percent Change
Defense	70,839	1%
Health and Human Services	28,807	0%
NASA	11,527	5%
Energy	8,528	-1%
National Science Foundation	4,194	3%
Agriculture/USDA	2,039	-16%
Veterans Affairs	786	0%
Commerce	1,013	-11%
Homeland Security	1,467	24%
Transportation	808	8%
Interior	582	-5%
Environmental Protection Agency	569	-1%
Other	1,145	-8%
TOTAL	132,304	1%

*Impact of appropriations not yet known

FY 2006 Federal Budget

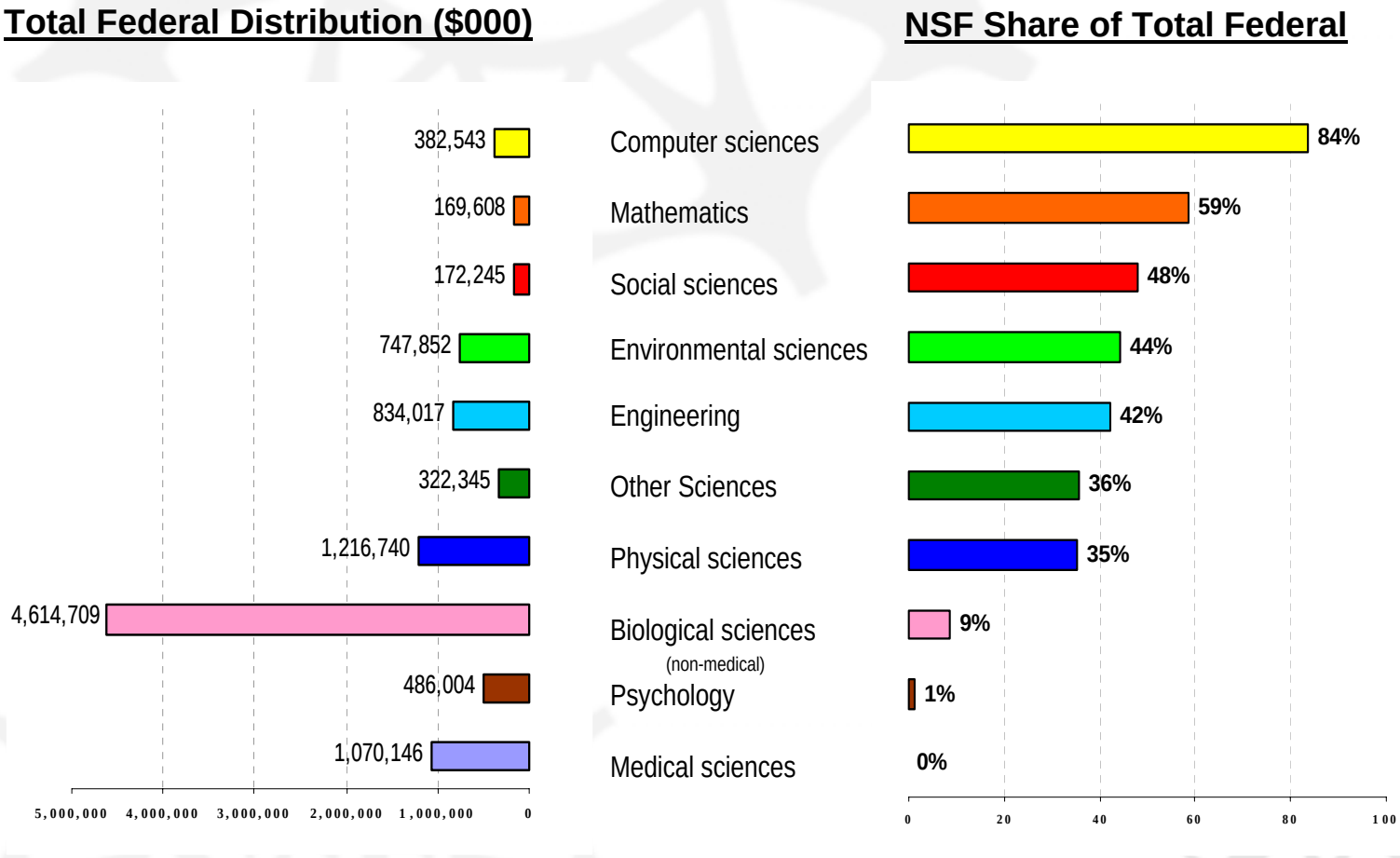
NSF (and other agencies) currently under a Continuing Resolution until…

U.S. R&D, by source of funds: 1953–2002



NOTE: Other sources include nonprofit, academic, and non-Federal government.

Federal Obligations for Basic Research at Academic Institutions, FY 2002



NSF FY 2006 Request by Account
(Dollars in Millions)

	FY 2005 Current	FY 2006 Request	Amount Change	Percent Change
Research & Related Activities	$4,220.55	$4,333.49	$112.94	2.7%
Major Research Equipment & Facilities Construction	173.65	250.01	76.36	44.0%
Education & Human Resources	841.42	737	-104.42	-12.4%
Salaries & Expenses	223.20	269.00	45.8	20.5%
National Science Board	3.97	4	0.03	0.8%
Office of Inspector General	10.03	11.5	1.47	14.7%
Total, NSF	$5,472.82	$5,605.00	$132.18	2.4%

NSF FY 2006 Research & Related Activities Request by Directorates (Dollars in Millions)

	FY 2005 Current	FY 2006 Request	Amount Change	Percent Change
Biological Sciences	$576.61	$581.79	$5.18	0.9%
Computer & Information Science & Engineering	613.72	620.56	6.84	1.1%
Engineering	561.3	580.68	19.38	3.5%
Geosciences	694.16	709.1	14.94	2.2%
Mathematical & Physical Sciences	1,069.86	1086.23	16.37	1.5%
Social, Behavioral & Economic Sciences	196.9	198.79	1.89	1.0%
Office of International Science & Engineering	33.73	34.51	0.78	2.3%
U.S. Polar Research Programs	276.84	319.41	42.57	15.4%
U.S. Antarctic Logistical Support Activities	67.52	67.52	0	0.0%
Integrative Activities	129.91	134.9	4.99	3.8%
Total, R&RA	$4,220.55	$4,333.49	$112.94	2.7%

NSF FY 2006 Budget Appropriations: House and Senate Marks

(Dollars in Millions)

Activity/Program	FY 2005 Current Plan	FY 2006 Budget Request	FY 2006 House Mark	FY 2006 Senate Mark
Research amd Related	$4,220.55	$4,333.49	$4,377.52	$4,345.21
BIO	$576.61	$581.79		
CISE	$613.72	$620.56		
ENG	$561.30	$580.68		
GEO	$694.16	$709.10		
MPS	$1,069.86	$1,086.23		
SBE	$196.90	$198.79		
OISE	$33.73	$34.51		$34.51
OPP	$344.36	$386.93		$386.93
IA	$129.91	$134.90		
MREFC	$173.65	$250.01	$193.35	$193.35
Education & Human Resources	$841.42	$737.00	$807.00	$747.00
Salaries & Expenses	$223.20	$269.00	$250.00	$229.90
Office of Inspector General	$10.03	$11.50	$11.50	$11.50
National Science Board	$3.97	$4.00	$4.00	$4.00
NSF TOTAL	$5,472.82	$5,605.00	$5,643.37	$5,530.96

NSF FY 2006 Budget Appropriations: House Language

R&RA *"The recommendation does not include specific funding allocations for each directorate or for individual programs and activities."*

EHR: *"...disappointed by the reductions proposed in the budget in this account."*

- Specific EHR Division allocations incl. MSP at Request/Adds $70M to Request
- Recognizes the value of informal education
- Encourages NSF to allocate funds to: Noyce, ATE, HBCU-UP, but no specific amounts & no other programs mentioned

NSF FY 2006 Budget Appropriations: Senate Language

R&RA: Request level for OPP/OISE, no other directorate

- Plant Genome $100M
- Recommends Request for Nano
- NRAO $51.4M

EHR: *"...urges NSF to work towards increasing the number of women, minorities, and other underrepresented groups to the greatest extent possible.."*

- Funds the Request: HBCU-UP, LSAMP, THRUST
- Recommends the Request: TCUP
- EPSCoR $100M w/ $65M for RII
- MSP +$4M over Request (rejects MSP only at Education)

NSF Priority Areas

Biocomplexity in the Environment

http://www.nsf.gov/news/priority_areas/biocomplexity/index.jsp

- Fiscal year 2006 Areas of Emphasis:
  - Earth Systems, Cycles and Pathways;
  - Dynamics of Coupled Natural and Human Systems;
  - Materials Use: Science, Engineering and Society;
  - Microbial Genome Sequencing; and
  - Ecology of Infectious Diseases.

- Two Solicitations will be posted by the end of 2005
  - Carbon & Water in the Earth's System
  - MUSES – Materials Uses: Science, Engineering & Society

Cyberinfrastructure

http://www.nsf.gov/news/priority_areas/cyberinfrastructure/index.jsp

- FY 2006 Areas of Emphasis:
  - NSF's current cyberinfrastructure investments are guided by three principles:
    - Science and engineering opportunities must drive cyberinfrastructure investments;
    - Development of intellectual capital to develop, sustain and effectively utilize cyberinfrastructure is critical; and
    - Unwavering attention to interoperability and sustainability will provide economies of scale and scope as well as guard against the balkanization of science.
- HPC System Acquisition – NSF 05-625
  - Proposal Deadline: February 10, 2006

Human & Social Dynamics

http://www.nsf.gov/news/priority_areas/humansocial/index.jsp

- Fiscal Year 2006 Areas of Emphasis:
  - **Agents of Change** – focuses on large-scale change in humanity and society (e.g., industrial globalization, disease epidemics and how we influence technological change);
  - **Dynamics of Human Behavior** – applies state-of-the-art methods and cross-disciplinary approaches to better understand the dynamics that influence human behavior and action; and
  - **Decision-Making, Risk and Uncertainty** – improve decision-making by studying risk perception and response to stimuli such as hazards and extreme events and the role of educational systems in that response.
- Next Solicitation: Spring 2006

Mathematical Sciences

http://www.nsf.gov/news/priority_areas/mathematics/index.jsp

- Fiscal Year 2006 Areas of Emphasis:
  - Fundamental Mathematical and Statistical Sciences;
  - Advancing Interdisciplinary Science and Engineering;
  - Mathematical and Statistical Challenges Posed by Large Data Sets;
  - Managing and Modeling Uncertainty;
  - Modeling Complex Nonlinear Systems; and
  - Advancing Mathematical Sciences Education.

- Innovations at the Interface with the Physical and Computer Sciences and Engineer – NSF 05-622
  - Proposal Deadline: December 20, 2005

Nanoscale Science & Engineering

http://www.nsf.gov/news/priority_areas/nano/index.jsp

- Fiscal Year 2006 Areas of Emphasis:
  - Understanding and controlling the assembly of nanoscale materials;
  - Research enabling nanoscale as the most efficient manufacturing domain, including fabrication of nanostructured materials and catalysts;
  - Nanobiotechnology and nanobiomedicine;
  - Innovative nanotechnology solutions for explosives detection and protection;
  - Understanding and potential application of quantum effects and other nanoscale phenomena;
  - Nanoelectronics beyond complementary metal-oxide superconductors and nanophotonics;
  - New instrumentation and standards development; and
  - Education and training regarding nanotechnology.

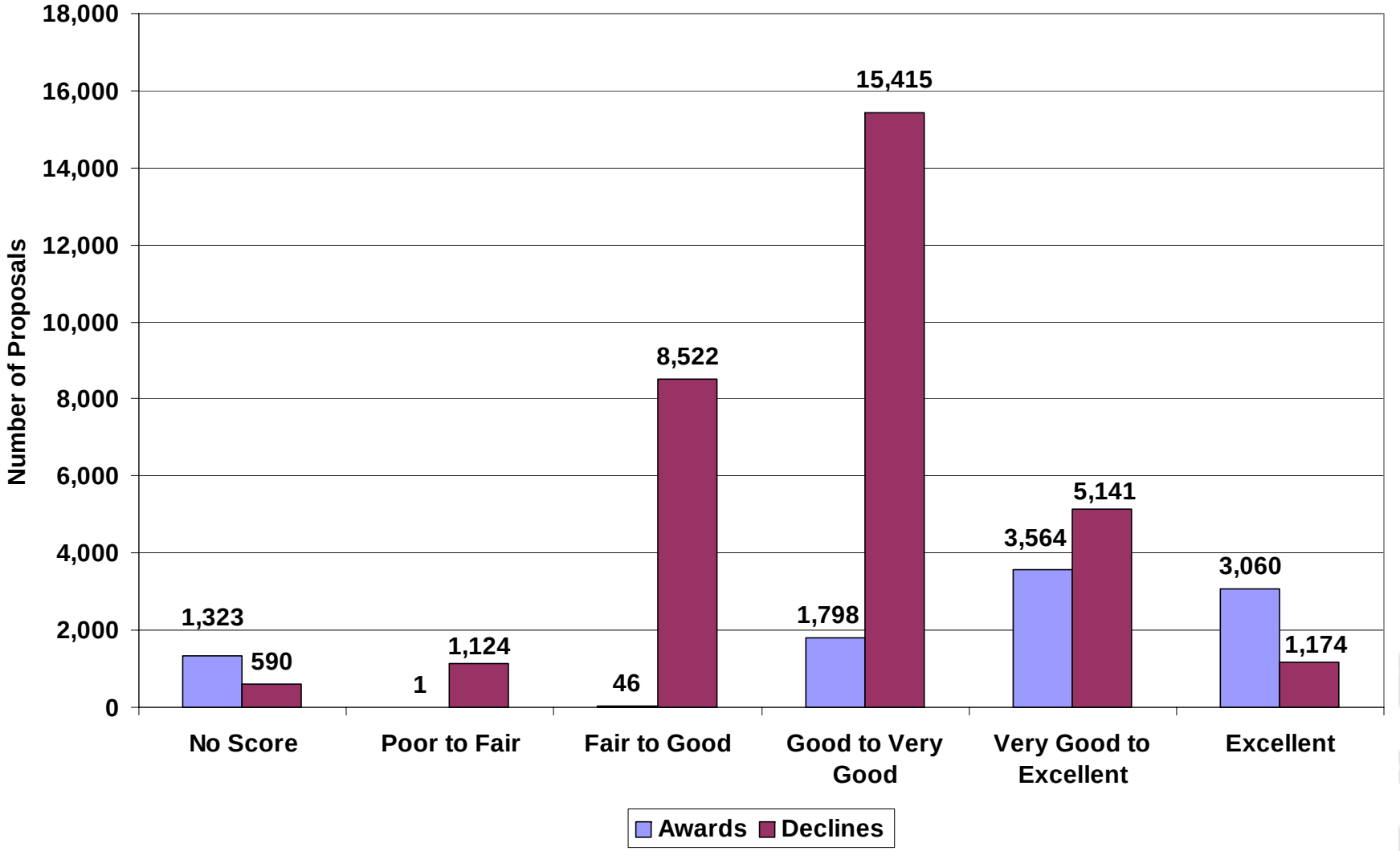
- Active Nanostructures and Nanosystems (ANN) – NSF 05-610
  - Proposal Deadline: November 29, 2005

Current Proposal, Award and Funding Trends

NSF Recent Trends: FY 2001 to FY 2005

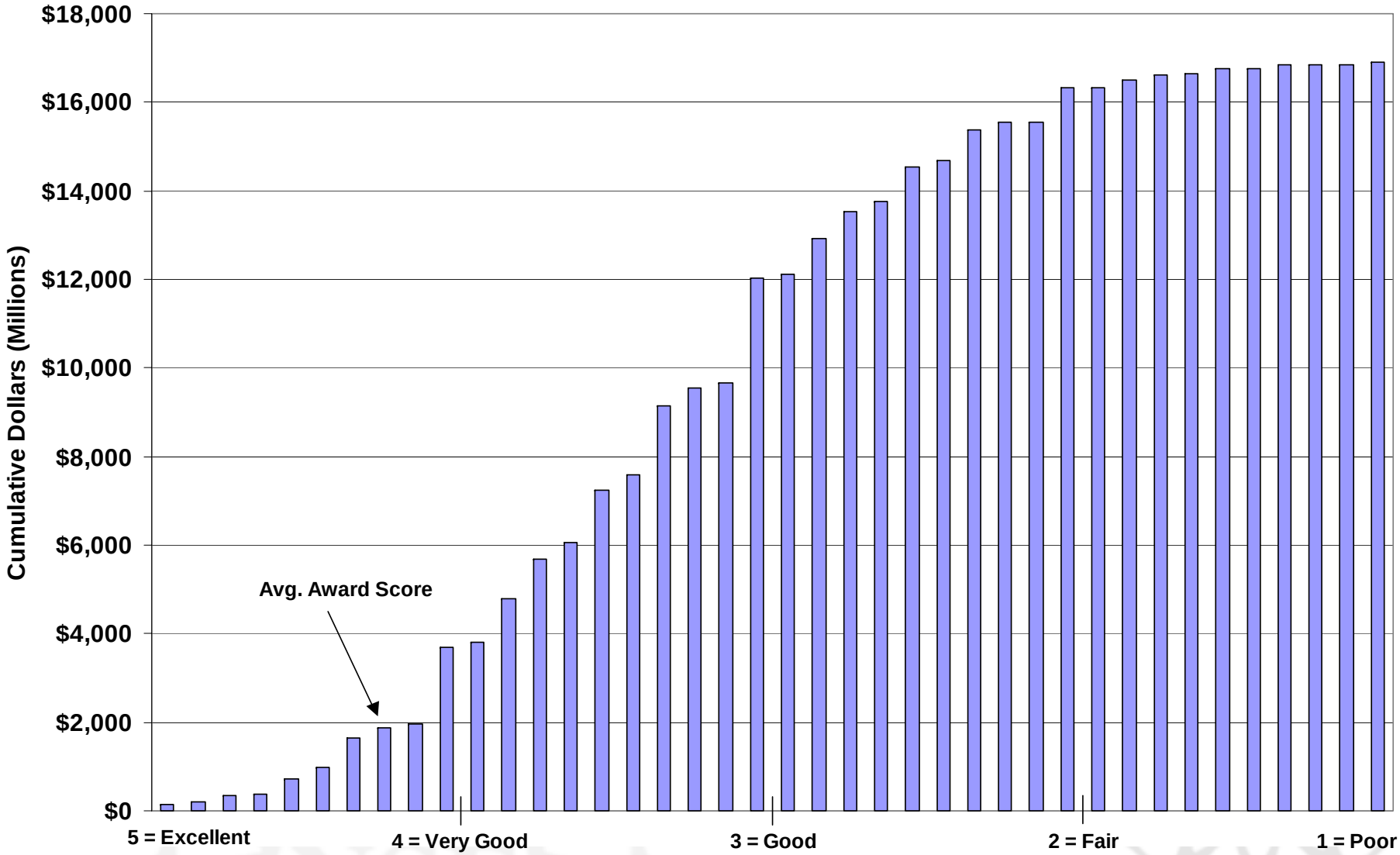
	FY01	FY02	FY03	FY04	FY05	Change from FY01 to FY05
Budget Obligations (Millions of Dollars)	$4,532	$4,774	$5,369	$5,656	N/A	N/A
Admin & Mgmt	$214	$231	$251	$291	N/A	N/A
# of Employees	1,220	1,242	1,244	1,301	N/A	N/A
# of Competitive Proposals	31,942	35,164	40,075	43,759	41,760	31%
# of Competitive Awards	9,925	10,406	10,844	10,380	9,794	-1%
Aver. Annual Res. Grant Size	$113,601	$115,666	$135,609	$139,000	$143,669	26%
Aver. Research Grant Duration (years)	2.9	2.9	2.9	2.9	2.9	-

Distribution of Average Reviewer Ratings
FY 2005

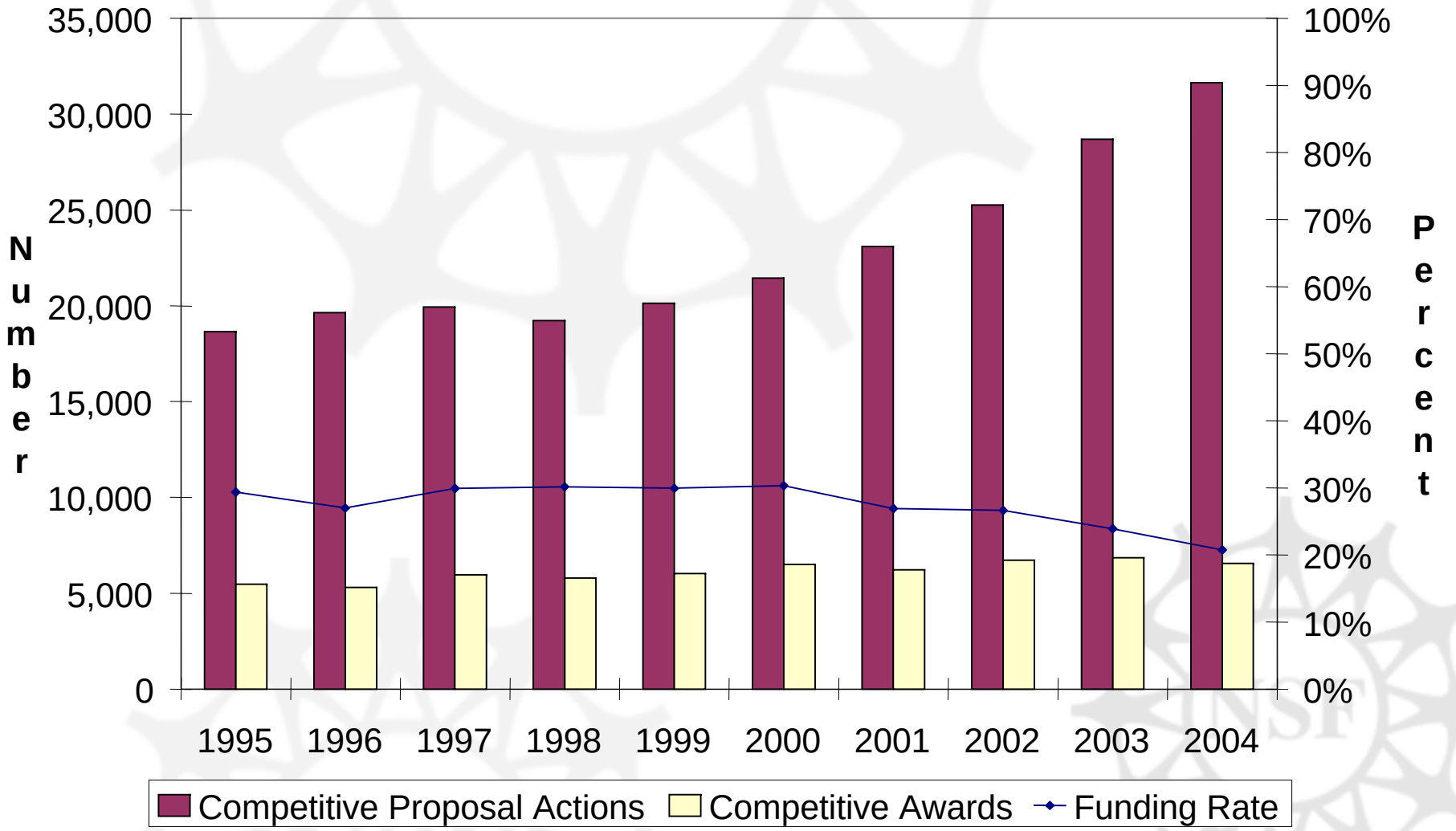


Number of Proposals: 31,966 Declines, 9,792 Awards

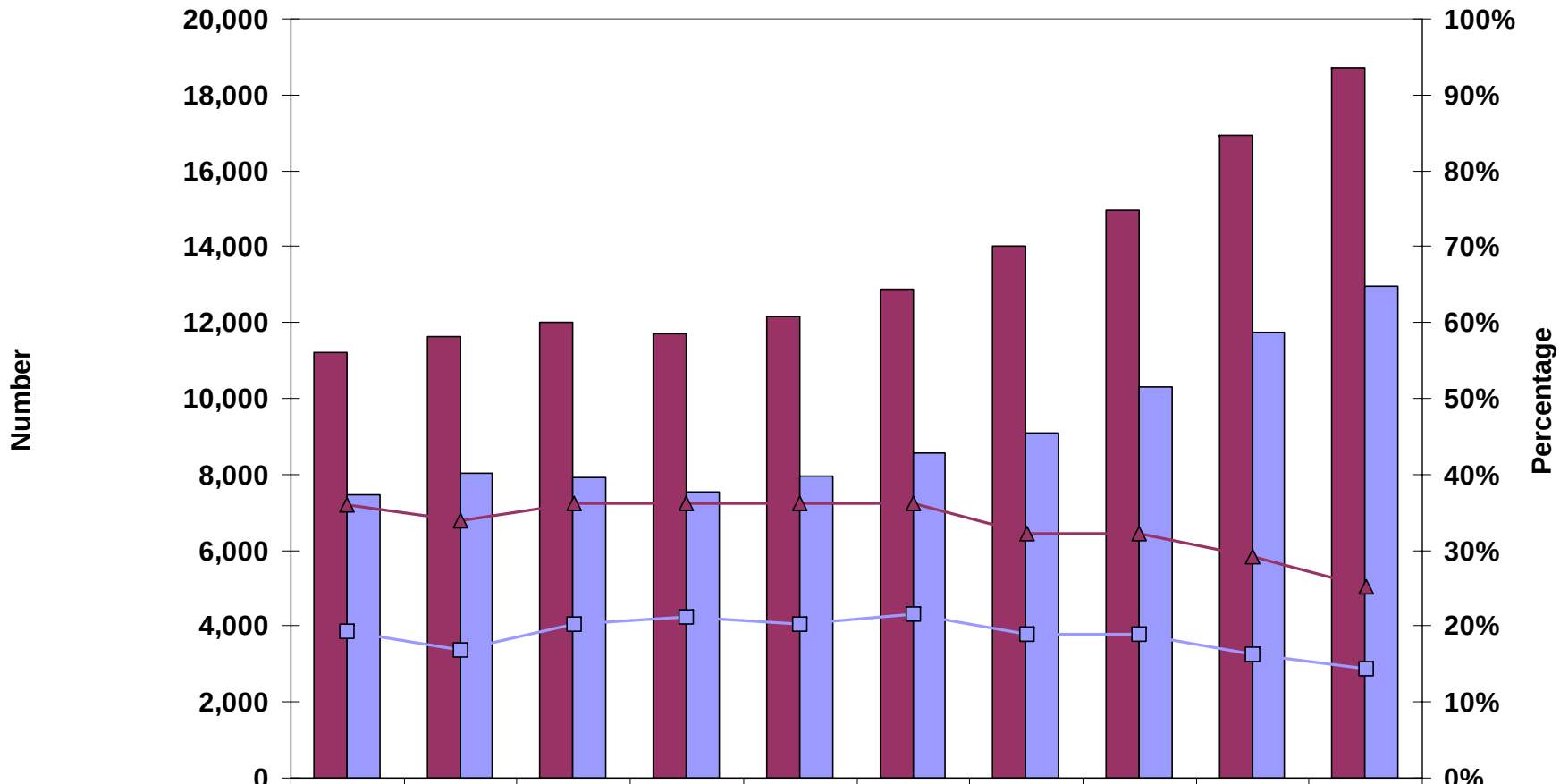
Cumulative Requested Amounts for Declined Proposals by Average Reviewer Score for FY 2005



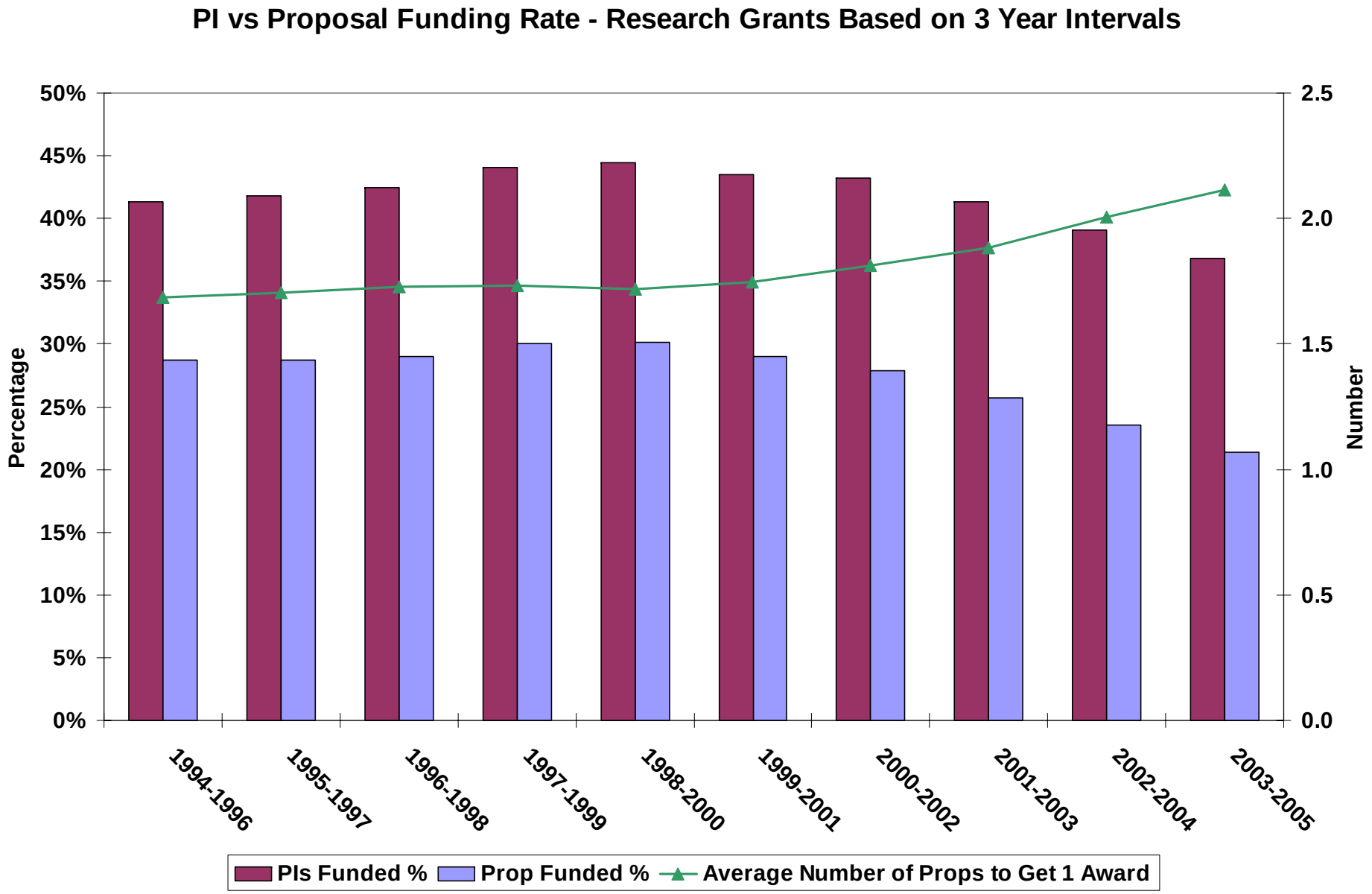
NSF Funding Rate for Competitive Awards - Competitive Research Grants



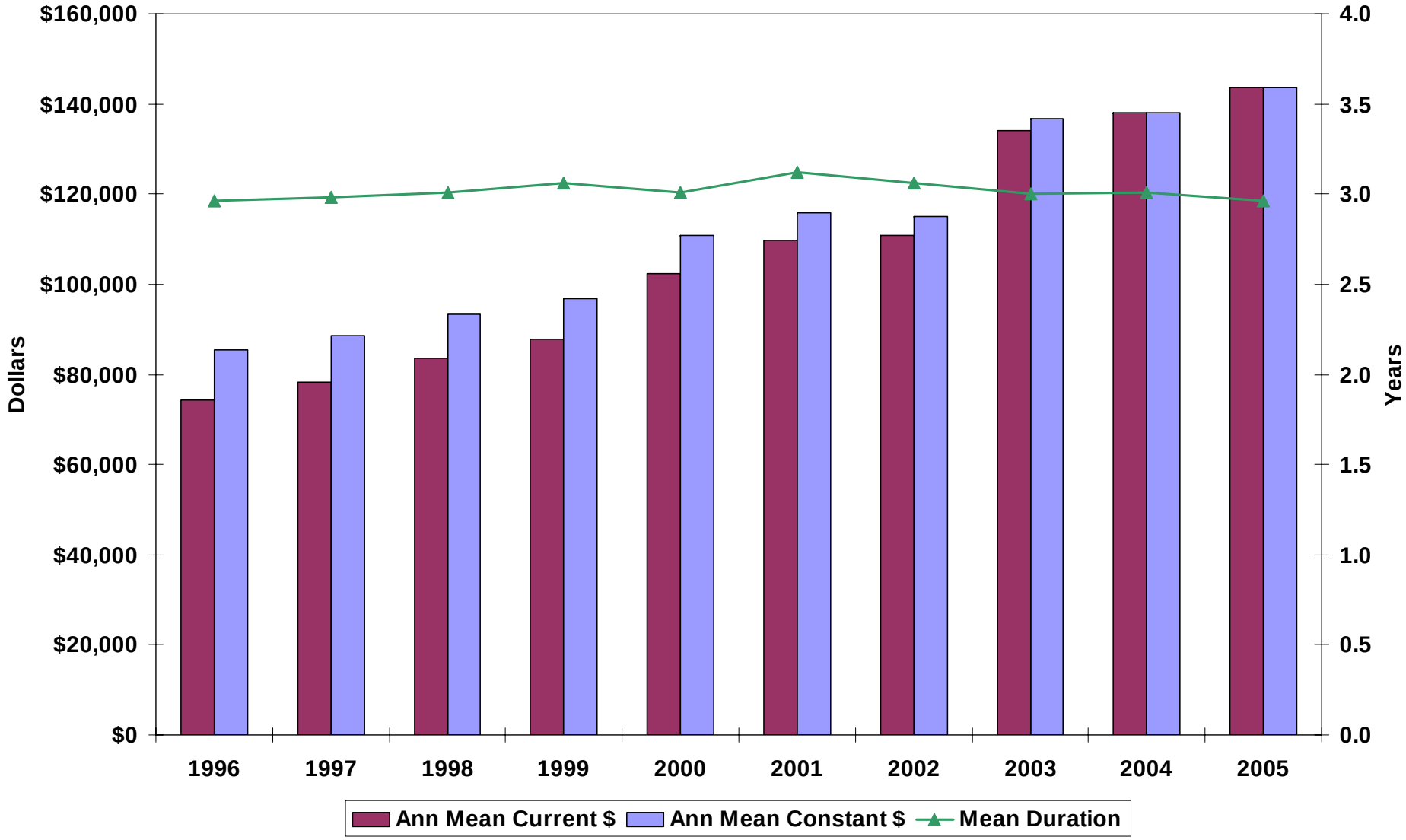
Research Grant Proposals by PI Type



	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Proposals - Prior PI	11,203	11,635	12,026	11,693	12,172	12,885	14,013	14,965	16,944	18,700
Proposals - New PI	7,446	8,013	7,910	7,526	7,951	8,561	9,084	10,286	11,752	12,941
Funding Rate - Prior PI	36%	34%	36%	36%	36%	36%	32%	32%	29%	25%
Funding Rate - New PI	19%	17%	20%	21%	20%	22%	19%	19%	16%	14%


PI vs Proposal Funding Rate - Research Grants Based on 3 Year Intervals
Percentage
Number
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
2.5
2.0
1.5
1.0
0.5
0.0
1994-1996
1995-1997
1996-1998
1997-1999
1998-2000
1999-2001
2000-2002
2001-2003
2002-2004
2003-2005
PIs Funded %
Prop Funded %
Average Number of Props to Get 1 Award

NSF Competitive Award Size and Duration - Research Grants



*Based on estimated 2003-2004 Deflators

Key Documents

- FY 2006 NSF Budget Request
  - http://www.nsf.gov/about/budget/fy2006/
- Grant Proposal Guide (NSF 04-23)
  - http://www.nsf.gov/publications/pub_summ.jsp?ods_key=GPG
- Science and Engineering Indicators
  - http://www.nsf.gov/sbe/srs/seind04/start.htm
- When in doubt –
  - http://www.nsf.gov/

Challenges, Opportunities & the Long Hard Road Ahead

What's the latest on .....

- Challenges and Opportunities
  - Political Landscape/Deficit Reduction/Constrained Budgets
  - Continuing Management Challenges
  - Congress and the Budget
  - Research Business Models Subcommittee
  - Grants Policy Committee

Challenges

- Political Landscape/Deficit Reduction/Constrained Budgets
  - “War Time” Environment
  - Hurricane Katrina/Rita Relief
  - Economic/Job Uncertainty
  - Export Controls
- Continuing Management Challenges
  - Award Size, Duration and Success Rate
  - Financial Statement Audits (ours & yours)
  - Improper Payments

Hurricane Katrina Relief

- What is happening on the legislative front?
  - Two supplemental funding bills over $60 billion.
  - A third supplemental is now at OMB for review – on the order of $200 billion with a fourth supplemental probably early next year
- What is the higher education community in Washington doing?
  - Working with affected universities and host institutions
  - Working to enhance the Administration's third supplemental
- What is the focus of the efforts to help students and institutions?
  - Short-term needs of students and institutions
  - Financial Assistance to host institutions
  - Replacement of lost revenue to institutions
  - Assistance for rebuilding and revitalization
  - Incentives for students and faculty to return

Why do we . . . ?

- Several Reasons
  - Congressional Intent (laws, regulations, authorizing language, etc.)
    - Example: Improper Payments Improvement Act of 2002
  - Administration Practices or policies (OMB guidance, Administration's political platform, etc.)
    - Example: Nanotechnology Initiative
  - Agency/Department Policy (grants policies, terms and conditions, operating guidance, etc.)
    - Example: NSF Cost sharing policy
  - Community Drivers (NAS, FDP, COGR, AAU, NASCULGC, professional societies, etc.)
    - Example: Success rates, award size and duration

Award Size/Duration

- Surveys of PI's & Institutions in 2001
- Study Results Published July 2002
- New average grant size goal
  - From $100K/3 years to $250K/5 years
  - Over time: currently at $138K/2.9 years
  - Declining success rates (33% → 25%)
- Trade-offs will have to be made

Financial Statement Audits

- Ours and Yours
  - Issue: Recording expenditures properly
- Federal Government
  - More scrutiny of FCTR's will require more documentation
  - Heightened scrutiny of A-133 reports
  - Site visits to high-risk awardees
- You Guys
  - Better accounting system; segregation of costs
  - Better documentation
  - Clean A-133 audits (OIG reviews/recommendations)

Improper Payments Information Act of 2002

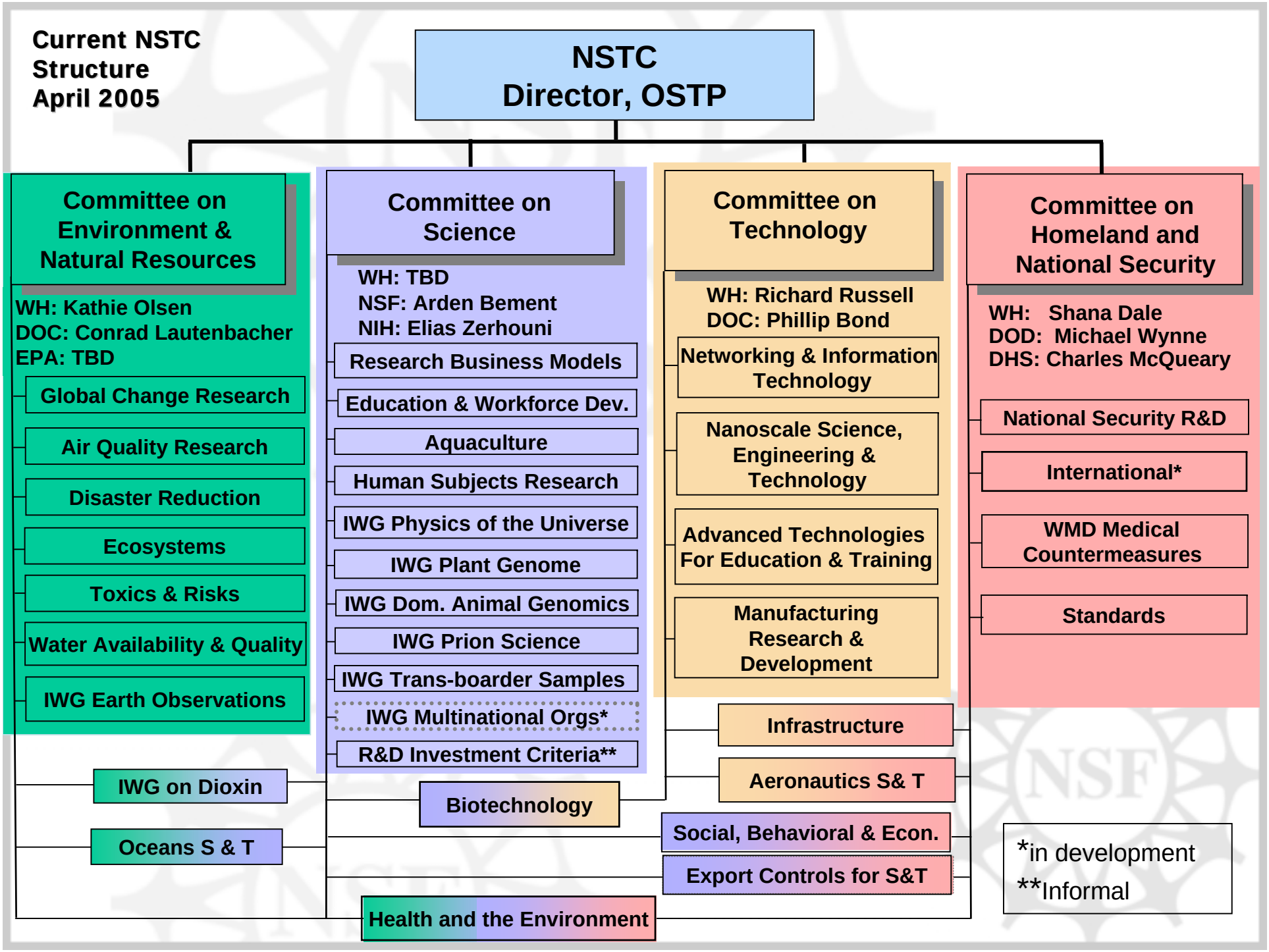
- History
  - The Federal Government makes more than $45 billion in improper payments each year in programs that represent $1 trillion in outlays
  - IPIA requires agencies to report on programs or activities with estimated improper payments exceeding $10 million and detail actions the agency is taking to reduce these improper payments
  - OMB further expanded the definition: *An erroneous or improper payment includes any payment that was made to an ineligible recipient or for an ineligible service*
  - NSF is the only research grant-making agency required to measure improper use of grant funds. All others are required to report entitlement or block grants programs

Improper Payments Information Act of 2002 (cont'd)

- Current Action
  - NSF sampled improper payments on all site visits to high-risk grantees as identified in our Award Monitoring Program
  - Continue innovative efforts for administering an improper payments program as part of a holistic grants monitoring approach, which assures accurate award institution identity and grant eligibility
- Message: Federal Government following taxpayer funds down to the last dollar

Opportunities

- Research Business Models Subcommittee, Committee on Science, National Science and Technology Council
  - Coordinating across Federal agencies to address important policy implications arising from the changing nature of interdisciplinary and collaborative research, and
  - examining the effects of these changes on business models for the conduct of scientific research sponsored by the Federal government.
  - Working with the FDP, COGR, and others


Current NSTC Structure April 2005
NSTC
Director, OSTP
Committee on Environment & Natural Resources
WH: Kathie Olsen
DOC: Conrad Lautenbacher
EPA: TBD
Global Change Research
Air Quality Research
Disaster Reduction
Ecosystems
Toxics & Risks
Water Availability & Quality
IWG Earth Observations
Committee on Science
WH: TBD
NSF: Arden Bement
NIH: Elias Zerhouni
Research Business Models
Education & Workforce Dev.
Aquaculture
Human Subjects Research
IWG Physics of the Universe
IWG Plant Genome
IWG Dom. Animal Genomics
IWG Prion Science
IWG Trans-boarder Samples
IWG Multinational Orgs*
R&D Investment Criteria**
Committee on Technology
WH: Richard Russell
DOC: Phillip Bond
Networking & Information Technology
Nanoscale Science, Engineering & Technology
Advanced Technologies For Education & Training
Manufacturing Research & Development
Committee on Homeland and National Security
WH: Shana Dale
DOD: Michael Wynne
DHS: Charles McQueary
National Security R&D
International*
WMD Medical Countermeasures
Standards
IWG on Dioxin
Oceans S & T
Biotechnology
Health and the Environment
Infrastructure
Aeronautics S& T
Social, Behavioral & Econ.
Export Controls for S&T
*in development
**Informal

Research Business Models (Cont')

SUCCESS!

- Three of Ten Initiatives Approved in January '05!
  - Dr. Marburger, Director, OSTP signed a memo to research agency heads to implement a policy to acknowledge multiple PIs
  - Dr. Kathie Olsen, Assoc. Dir. For Science, OSTP and the Controller, OMB signed a memo endorsing the FDP subagreement as an effective practice
  - FDP "research terms" were published in the Federal Register as a proposal to implement more broadly and routinely across all agencies (were due 2/29)
- See the RBM web site for the latest news http://rbm.nih.gov/

Research Business Models (Cont')

CONTINUING PROGRESS!

Several Activities are in the Pipeline

- Streamlined and consistent progress report formats across agencies-
  - will be discussed at May FDP meeting
  - will also be published in the Federal Register for comments
- Enhanced A-133 compliance supplement on subrecipient monitoring
  - Describe risk management and streamlined review for "Prime" subrecipients with satisfactory audits
  - Possible implementation in the 2006 compliance supplement

Research Business Models (Cont')

Activities in the Pipeline (cont'd)

- Uniform Conflict of Interest policy
  - Request for Information may be published for comment this Spring, if it's not confused by NIH issues
  - When finalized, for assistance awards, it could be published in OMB Circular A-110
- Models of Support for Instrument Operations and Maintenance (O/M)
  - Will address a variety of effective practices in supporting O/M for mid-size instrumentation
  - May attempt to address both institutional and agency practices that enhance ability to deal with unanticipated future O/M requirements

Conflict of Interest

- New Intramural Policy at NIH
- Extramural policies in place at NIH and NSF
- Community seeking broader clarification, government-wide
- RBM attempting to provide such clarification

Federal Government Future Directions

- Consolidation:
  - Started with payroll functions
  - Spreading to include:
    - Financial accounting functions
    - Grants management functions
    - Procurement functions
    - Human resources functions
- Streamlining:
  - Grants.gov: FIND and APPLY
  - 424R&R dataset
  - Terms and Conditions
  - Project Reports